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(54) "A SELF-SUPPORTING BUILDING UNIT, SUCH AS A ROOF UNIT, COMPRISING HOLLOW ELEMENTS OF EXTRUDABLE, TRANSPARENT PLASTICS"

(71) I, HENRYK SOKOLER, a citizen of Denmark, of No. 5 B, Langagervej, 4000 Roskilde, Denmark, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:-

The invention relates to a self-supporting building unit such as a roof unit for a self-supporting roof comprising a series of hollow elements of extruded, transparent plastics having ducts of substantially rectangular cross-section and joining members at opposite sides of each element to be interconnected with joining members of adjacent hollow elements and thereby forming locking channels, in which are inserted locking members, said building unit thus being composed of a number of parallel ducts separated by locking channels of elongated cross sections.

In Danish Patent Specification No. 131 050 is described a building panel composed of extruded hollow elements of plastics each element having several compartments obtained by inserting vertical partitions between the outer walls. The vertical partitions serve as I-beams and the intention is to increase the strength of larger profiles without increasing the amount of material.

The ducts of the hollow elements of which the known transparent or translucent roof units are composed have each a cross-section of about 5 × 8 cm, so that a unit composed of several elements forms a row of ducts located side by side each having a relatively small cross-section. In a duct structure of this kind, the convection flow in the enclosed air is due to the contruction, reduced substantially, which has made this type of transparent roof units applicable for house-building and distinct from the conventional single-layer plastics roof which is preferably used as a roof for covering terraces, car-ports, shelters etc. The transparent plastics duct roof with two layers of plastics and ducts, which are closed at their ends offers a heat insulation which has made it well suited for a series of purposes not only as roofs, but also as walls in the form of so-called light panels.

Roofs of the duct type here referred to have proved to be particularly well suited for use at works where there is a danger of explosions since they are sufficiently robust to satisfy the normal strength moduli, but on the other hand offer the advantage that under the influence of a sudden increase in pressure from the inside the roof is disintegrated into small pieces, each of which presents only a slight risk of injury to people when dropping down. Allowing a certain latitude of terminology one might call such roofs "explosion-tolerant".

Plastics duct roofs and duct light-panels have got a considerable and significant scope of application not only with regard to safety, but also to environment. The possiblity of admitting daylight through whole surfaces of translucent plastics to the interior of factories and storehouses creates better working conditions and results in economy in energy for lighting and heating purposes.

Under climatic conditions and other circumstances precluding the use of the prior art plastics duct roofs it has so far been necessary to rest contented with the more traditional methods of providing a satisfactory insulation and to renounce translucency

and "explosion-tolerance".

Irrespective of the fact that during the many years translucent plastics duct roofs have been known it was the general belief that it would be impossible to achieve more within this field, the basis for the present invention has been the problem of providing an improved hollow element having properties which make it possible to extend the scope of application beyond what has so far been possible.

According to the invention, each hollow element is provided with an internal partition substantially parallel to the outer surface of the building unit.

Surprisingly, by this measure a considerable reduction of the K-value is achieved so that the increase in the insulation properties easily balances the increase in manufacturing costs. The relatively thin partition does not increase the outer dimensions of the unit and entails no considerably larger consumption of material, and it does not reduce the translucency to such a degree that the environmental advantages are lost. The "explosion-tolerant" nature of the elements and the advantages of having a single unitary element of predetermined dimensions is preserved. This is, inter alia, of importance architecturally and keeps the mounting costs down.

In the German Patent Application No. 25 30 257.2 a self-supporting roof is described in which in the channels formed by the joining members on the transparent hollow elements thin locking bands are inserted which, when the roof is mounted, are made to lie in vertical planes and act as supporting members. When such a roof is loaded to the ultimate breaking stress, it turns out that the thin bands bend outwardly in a kind of folding. The vertical walls of the profile elements forming the locking channels serve for keeping the thin bands in the vertical plane under load. By the addition of the partition herein described in the said ducf element a strengthening of the vertical side walls is provided. By the combination of the through locking members having a central thickening, which abuts against the walls in the ducts, and the profile element according to the present invention a roof unit is obtained having a substantially central support over the whole unit, and this contributes essentially to the stability.

Below, the invention is explained in greater detail with reference to the purely schematical accompanying drawings in which,

Figure 1 in perspective view shows the essential parts of an embodiment of a roof unit.

Figure 2 in perspective view shows part of an embodiment of a transparent profile el - ment for a roof unit and

Figure 3 shows seen from one nd a roof composed of two roof units supported by beams.

In Figure 1 is shown a hollow element connected to an adjacent hollow element of which only a part is illustrated. The first mentioned transparent hollow element has two vertical side walls 1 and 2 and two horizontal side walls 3 and 4 which together form a duct of an approximately rectangular cross-section. The two horizontal surfaces 3 and 4 are convex in the example shown, but they may also be plane or concave. Incidentally, the surfaces 3 and 4 will generally be double-curved as the longitudinal axis of the hollow profile element will be curved, that is to say shaped as part of a circular arc, see Figure 3.

The hollow element comprises joining members 5 and 6, which are of an L-shaped cross-section, and joining members 7 and 8 which are U-shaped. When two neighbouring elements are joined, an L-shaped member 5 and 6, respectively, fits into corresponding U-shaped members 8 and 7, respectively, so that a channel is formed for a locking member 9, comprising a strip of metal, the cross-section of which appears from Figure 1. The locking member 9 has a central thickening 10, and aligned with this central thickening there is in the hollow element provided a partition 11 which forms an integral part of the hollow element and is preferably produced by the extrusion. The partition 11 may be thinner than the other walls in the hollow element when the primary object is to reduce the K-value.

To the right in Figure 1 is shown a part of a second, adjacent hollow element, which is connected to the first mentioned hollow element shown to the left in Figure 1 by means of joining members 5a and 7a cooperating with the joining members 8 and 6, respectively. 1a denotes that vertical side wall of the second hollow element which together with the vertical side wall 2 encloses a channel for a locking member 10, which has only a thickness of say 3 mm. 3a and 4a are the outer walls of the second hollow element and 11a is the partition, which together with the partition 11 are in a position aligned with a thicker part of the locking member 10 shown approximately in cross-section in order to better illustrate the different parts forming the locking channel.

The hollow element shown in Figure 2 has a cross-section which is particularly suitable in connection with the material polycarbonate. The joining members have rounded shapes, and the corresponding locking members are shaped so as to correspond to the cross-sections.

The position of the partitions 11 in a roof is illustrated by th dotted line in Figure 3 in which two roof units 30 and 31 are shown

supported by profile carriers fixed to beams. 33. The roof units are composed by hollow elements which are curved to form a circular arc. The locking member 10, Figure 1 are curved in the same manner and can therefore be inserted in the locking channels either before or after the assemblage of the extruded hollow elements. A roof as described is denoted self-supporting because it is only supported at the lower ends by the beams 33. Thus a roof of this kind may have any length without any other support.

The partition in the different embodiments of the hollow elements may be formed as a particularly sound-deadening wall.

The K-value mentioned in this specification refers to the specific heat transmission coefficient which is a measure for the insulating properties of a material.

WHAT I CLAIM IS:-

1. A building unit such as a roof unit for a self-supporting roof, comprising a series of hollow elements of extruded transparent plastics having ducts of substantially rectangular cross-section and joining members at opposite sides of each element to be interconnected with joining members of adjacent hollow elements and thereby forming locking channels, in which are inserted locking members, said building unit thus being composed of a number of parallel ducts separated by locking channels of elongate cross-sections, characterised in that each hollow element is provided with an internal partition substantially parallel to the outer surface of the building unit.

2. A roof unit as claimed in claim 1, wherein the dimensions of each of the cross-sections of the two channels in each extruded hollow element obtained by means of said partition are substantially 2.5 × 8 centimeters.

3. A roof unit as claimed in claim 1 or 2, wherein each locking member comprises a strip of metal acting as a carrying beam which at least along the lines where the partitions meet the side walls of the locking channel touches said side walls.

4. A roof unit as claimed in claim 1, 2 or 3, wherein the outer walls of said extruded hollow elements are slightly convex while the partition between these walls is plane and perpendicular to the side walls of the locking channels.

5. A building unit substantially as herein described with reference to the accompanying drawings.

6. An extruded hollow element for a building unit, substantially as herein described with reference to the accompanying drawings.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

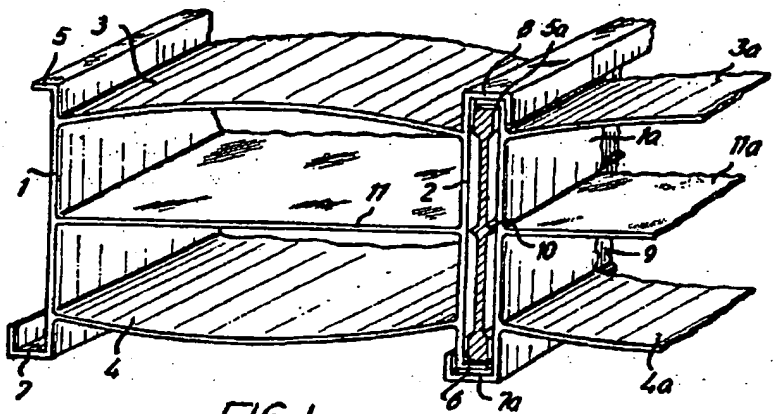

FIG. 1

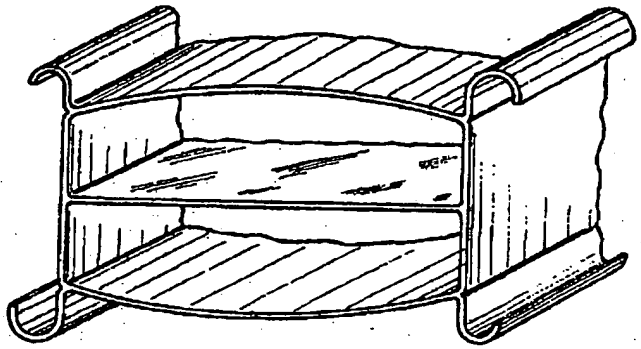

FIG. 2

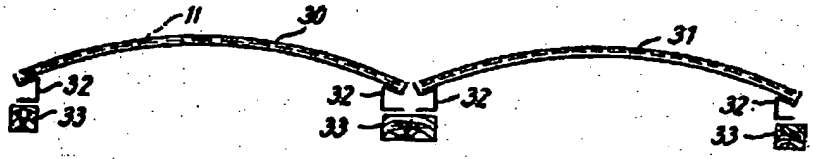

FIG. 3